

3.4.9 Diet Assessment

I. BACKGROUND AND RATIONALE

1. Many dietary factors may be important in the development of atherosclerosis, either by promoting obesity or through metabolic pathways independent of obesity. Nutrients of interest include total caloric intake, dietary fats (total fat and specific fatty acids), nutrient antioxidants (vitamins E, C, and others), B-complex vitamins, iron, and others. In addition, there is increasing recognition of the potential health effects of whole foods, food groups, and other dimensions of dietary patterns. For example, Jacobs et al (1998) reported that increased intake of whole grain foods was associated with significantly reduced risk of ischemic heart disease among postmenopausal women. Finally, use of traditional nutrient supplements (e.g., multi-vitamins, single-dose vitamin or mineral supplements) and non-traditional nutritional supplements (e.g., echinacea, St. John's wort, evening primrose) may also have an impact on the development of atherosclerosis; however, they have received little rigorous study to date—particularly the non-traditional supplements.
2. The MESA dietary assessment is designed to facilitate analysis of specific nutrients, whole foods, and nutritional supplements, as well as overall dietary patterns. The opportunity to analyze and contrast dietary intake in a cross-section of four ethnic groups is a unique and important aspect of the study and may help us better understand how differences in dietary intake are related to observed ethnic differences in the development of subclinical atherosclerosis and clinical endpoints.
3. The participant's usual diet during the last year will be characterized using a 120-item food frequency questionnaire, modified from the validated Insulin Resistance Atherosclerosis study in which comparable validity was observed for non-Hispanic white, African American, and Hispanic individuals (Mayer-Davis et al., 1999; Block et al., 1990). The MESA dietary assessment was modified to include foods typically eaten by Chinese groups and to collect supplemental information concerning hypotheses about whole grains, processing of plant food, flavonoids, as well as longstanding hypotheses about nutrients such as fat and vitamins. In addition, a number of nutrients have been added, including specific fatty acids and carbohydrates. The underlying nutrient database will be updated to incorporate the appropriate nutrient values for these items.

II. METHODS

1. Most participants will self-administer the questionnaire, with support from certified clinic staff to introduce and explain the form to the participant and review and edit the form upon its return. Certified interviewers will administer some questionnaires, when necessary, due to problems such as illiteracy or poor vision. Guidelines are provided below for both the self-administration and interviewer-administration of the form.
2. The goal of the diet interview is to obtain information about *usual* dietary practices of the participants, and to do so consistently at all field centers. Ideally, for a hypothetical participant, the same results would be obtained no matter who is administering the questionnaire, how it is administered (self or interviewer), when it is administered, or where it is administered. However, in any multi-center study, differences in the administration of a questionnaire will exist among staff and interviewers, among centers and over time. These differences can seriously bias results of statistical analyses. Thus, standardization of the administration of the nutrition form is critical to the data quality. The DAC has established certification guidelines (see Training and Certification) and will maintain listings of certified staff and interviewers.
3. Instructions for Participant Self-Administration of Food Frequency Section of the Diet Questionnaire
 - 3.1 In order to obtain valid and accurate information from the questionnaire, it is extremely important to give participants a clear, positive introduction and explanation of the questionnaire. *Keep the instructions and explanation simple!* Do not overwhelm the participant with too much detail; the entire explanation should take approximately 10 minutes.
 - 3.2 Form Preparation

The form will be printed using Teleform, as part of the complete clinic form packet for each participant. The food frequency section and the vitamin section will be printed together from the same form.

 - 3.2.1 Enter the Visit Date and the Acrostic on page 1 and page 18 (the first page of the vitamin section).
 - 3.2.2 Staple pages 1–17 (the food frequency section) together before giving to the participant. Be careful not to staple on or very close to the squares located on the corners of the form.
 - 3.2.3 The “Vitamins, Minerals, Other Nutritional Supplements” section (pages 18–21) will be completed at the time of the Medication Inventory. *This section of the form is not self-administered.*

3.3 General Instructions for Participants

- 3.3.1 Inform participants that we are interested in their overall pattern of eating for the past year. If they are concerned about not remembering what they ate, acknowledge their concerns and encourage them to recall to the best of their ability.
- 3.3.2 Show the participants the first page of the questionnaire. Encourage the participants to complete the questionnaire without a lot of distractions. However, if participants become fatigued, they can feel free to take a break. (Avoid excessive discontinuous completion of the form—this will hurt the quality of the information.)
- 3.3.3 Inform the participants that they may work on the questionnaire while waiting in the clinic and return the completed questionnaire to the clinic, or they may take it home to complete and mail back to the clinic using the stamped, addressed envelope that you can provide for them. *Be sure to provide a stamped envelope.* (Note: The place of form completion is a clinic- and potentially a participant-specific decision.)
- 3.3.4 Let the participants know whom they should call if they have any questions and how to contact that person.
- 3.3.5 Let the participants know by what date they should return the completed questionnaire.

3.4 Specific Form Completion Instructions for Participants

- 3.4.1 Go over the questions at the top of page two and have participants answer these questions in your presence.
- 3.4.2 Go over the example on page two. *Read through and point out (with a pencil) the specific possible responses for frequency and serving size.* Point out that the frequency choices are abbreviated on the following pages and encourage participants to refer back to the example if needed.
- 3.4.3 Explain to participants that a “small” serving size indicates that they eat a little of the food, compared to others of the same age and sex; that a “medium” serving size indicates that they eat an average amount of the food, compared to others of the same age and sex; and that a “large” serving size indicates that they eat a lot of the food compared to others of the same age and sex.

- 3.4.4 Encourage participants to be careful to mark the appropriate bubble and to fill in the bubbles completely using the pencil provided. (The Diet Assessment Center will send mechanical pencils to the clinics for the participants to use to complete the questionnaire.)
- 3.4.5 To get participants oriented to the form, tell them that the items are grouped by type of food (e.g., fruits, vegetables, meats). Point out that some of the foods may be unfamiliar to participants, because of the inclusion of an ethnically diverse study population.
- 3.4.6 Remind participants to include foods eaten at home and away from home. Remind them to include both meals and snacks.
- 3.4.7 Emphasize that no line should remain blank. Participants should select “Rare or Never” rather than simply skip foods they rarely or never eat.
- 3.4.8 Tell participants that if they don’t eat a particular food they may leave the *serving size* (but not the frequency) blank.

3.5 Instructions for Specific Questions (pages 4–16)

- 3.5.1 Make sure participants know that, if they eat cold cereal, they need to record on *page 4* the name of the cold cereal they eat most often.
- 3.5.2 Referring to *page 11*, point out to participants that the frequency responses for beverages are different from those for food. Point out that they may now select a frequency of as many as six or more servings.
- 3.5.3 Also on *page 11*, point out to participants that they should report milk drunk only as a beverage and that they should not include milk used on cereal or milk mixed with nutritional supplements.
- 3.5.4 Quickly point out to participants that *pages 13 and 14* ask general questions about the kinds of foods they eat. Tell participants that if they never eat the food in question, they should mark “I Do Not Eat The Food.”
- 3.5.5 Quickly point out to participants that *page 15* asks general questions about how their food is prepared. If participants do not prepare the food themselves, reassure them that they can just answer to the best of their ability. Also point out that the frequency responses on *pages 15 and 16* differ from those used for food the beverages.
- 3.5.6 Show participants that there is space to record any other food(s) that

they eat *at least once per week* and space to record anything else they would like us to know about their usual dietary practices.

3.5.7 Point out that page 17 is for clinic use only

3.5.8 Ask participants if they have any questions. In a positive manner, give the form to the participants. Let them know they may call anytime if questions arise.

4. Keeping Track of Forms

Encourage the participant to return the questionnaire promptly. If more than one week passes and the form has not been returned, call the participant at least once a day until you are able to make contact and make arrangements for the return of the form.

If you suspect the participant is unlikely, unwilling, or unable to complete the form, you may collect the data by interview, either in the clinic or over the phone.

5. Checking/Editing the Form When It Is Returned

When the questionnaire is returned (or the interview completed) spend a few minutes checking it over. Ideally, you will do this while the study participant is still there, if he/she completed the form in the clinic. If the questionnaire is returned by mail, check it as soon as possible, in case clarification is needed. Do not mail the form to the DAC until editing is complete. The goal is to identify obvious omissions or errors, not to judge the quality of the participant's diet.

5.1 Make sure the Participant ID is correct.

5.2 Check for skipped foods and missing information. If there are any omissions, attempt to fill in the blank spaces with the participant's help.

5.2.1 If there is an occasional missing line in the list of foods, you do *not* need to call the participant. If *two or more* items in a row are missing, call the participant to complete the items.

5.2.2 If only one of the questions on pages 13–14 is missing, you do *not* need to call the participant. If *two or more* items are missing, call the participant to complete the items.

5.2.3 If any other question has been skipped, call the participant.

5.3 Check for extremely unlikely frequencies, such as liver twice a day. If there is more than one questionable frequency, call the participant to confirm.

- 5.4 If the questionnaire has mostly “1’s” (1/day, 1/week, 1/month), verify that this is in fact what the participant means.
- 5.5 Roughly compare the responses to the quality control questions on page 16 to the responses in corresponding line items (e.g., fruits) to be sure they are reasonably consistent. (Over-reporting on the specific line items is more common than under-reporting. Do not be concerned about small inconsistencies: one high or low response is fine.)
- 5.5.1 Add up the frequencies of the following vegetables listed on page 6 and compare the total to that reported on page 16.
- Carrots
 - Broccoli, cabbage, cauliflower, brussel sprouts, sauerkraut, kimchee
 - Green beans, peas, snow peas
 - Corn, hominy
 - Winter squash, acorn squash
 - Any other vegetable including summer squash, zucchini, asparagus, mixed vegetables
- 5.5.2 Compare the frequency for “Cold cereal” on page 4 to that reported on page 16.
- 5.5.3 Add up the frequencies of the following fruits listed on page 3 and compare the total to that reported on page 16. (Note that seasonal fruits may make up the difference in the number reported on the quality control question; adjust for this, if necessary.)
- Apples, applesauce, pears
 - Bananas, plantains
 - Oranges, grapefruit, tangerines, kiwi
 - Dried fruits including raisins, prunes, figs, apricots
 - Any other fruit (pineapple, persimmon, grapes, other melon, canned peaches, fruit cocktail, etc.)
- 5.5.4 If responses are inconsistent by more than one frequency category, attempt to clarify.
- 5.5.5 Re-ask the quality control question, emphasizing “not counting salads, potatoes, or mixed dishes” for the question regarding vegetables and “not counting juices” for the question regarding fruit.
- 5.5.6 If the response is still inconsistent, briefly review the specific foods for clarification or correction, as needed.

- 5.5.7 If you cannot resolve the inconsistencies fairly easily, move on and note this in the comments section on page 17 (fill in bubble 3 and then record the comments).
- 5.6 Be sure that the name of the cold cereal is written in, if the participant eats cold cereal.
- 5.7 Code any additional foods reported within the body of the form, using guidelines provided in the Manual of Operations, or e-mail or fax questions to the DAC, with as much specific information as you have. The DAC will respond within a week, usually the same day.
- 5.8 If you know DAC input is needed, call us as while the question(s) and situation are still fresh in your mind.
- 5.9 Complete the comments section. If DAC review is needed, fill in bubble 3 and record comments. If DAC reviews have been completed, fill in bubble 2.
6. General Guidelines for Interviewer-Administration of Food Frequency Section of the Diet Questionnaire

We cannot expect participants to be able to remember exactly when they ate specific foods over the last year. It is the job of the interviewer to help participants provide reasonable estimates of what they usually eat.

To minimize interviewer differences in administration (including conducting the interview and recording the information), it is essential that the guidelines provided be followed very carefully.

6.1 Cultural Sensitivity

MESA has a major advantage because of the diverse population included across the clinical centers. The nutrition interview includes a wide variety of foods that are likely to contribute substantially to nutrient intake within the various subgroups of ethnicity and geographic region included in the study. *Keep in mind that the only important foods to consider in this dietary assessment are those that contribute substantially to overall usual nutrient intake.* Foods that are important from a cultural perspective but are eaten only infrequently (e.g., special holiday foods) generally do not contribute substantially to usual nutrient intake. These foods have not been included in the interview.

It is necessary to achieve a balance between cultural sensitivity, sensitivity to the individual, and standardization. For the purpose of standardization, each interviewer must include all foods when interviewing study

participants. For purposes of sensitivity to individual dietary choices and to culture, the interviewer must listen carefully to the participant, spending relatively more time on foods consumed more frequently and less time on foods rarely consumed. *Do not assume* that you can anticipate what a particular individual may eat. In today's cities, ethnic foods are easily available to all. Therefore, interviewers must be:

- familiar with all foods on the food frequency section
- familiar with the foods common in your community
- aware of possible language barriers
- aware of cultural and/or personal differences in communication styles

In addition, keep the following in mind during the interview:

- Present all lines on the nutrition interview.
- Do not assume you know what the participant will say. Cultural stereotypes do not always hold true for a given individual.
- If the participant is unfamiliar with a particular food, it is unlikely to be an important source of nutrients. Minimize time on these items.
- Be aware of and familiar with the variety of foods on the food frequency section. However, you do not need to know a lot of details. For example, if someone says they eat chorizo, you should know that chorizo is a sausage.
- Be aware of the foods in your community.
- If you do not know what a food is, ask the participant to describe it, including major ingredients and cooking method. Do not assume that the DAC will know what it is! Write the information down so that we can determine how to code the food.

6.2 General Interviewing Techniques

The skill and consistency of the interviewers will strongly influence the quality of the dietary data. General interviewing techniques are briefly reviewed here.

6.2.1 Establishing Rapport

- Establish and maintain a friendly and trusting atmosphere. Smile!
- Present questions accurately and non-judgmentally.
- Demonstrate that you are an understanding person.
- Accept information in a non-judgmental manner.
- Encourage active participation.
- Be prepared and know your material.

6.2.2 Presentation of the Interview

- Read in a natural and conversational rhythm.
- Read in a normal tone of voice.
- Read as if you are speaking.
- Read at a good pace...not too fast...not too slow...just right!!
- Be aware of participant's facial expressions (puzzled, confused, bored, fatigued, frustrated, amused) and respond accordingly.
- Ask every question on the interview...do not assume that you know the answer to the question.
- Be patient.
- Keep the interview simple and straight-forward. Don't get bogged down in details!

6.2.3 Probing Techniques. Listen carefully to the participant. Watch for irrelevant, vague, or incomplete answers. Acknowledge the response given and then probe to obtain the required information. Some useful techniques are listed below.

- Say nothing. Give participants a chance to think.
- Do not accept a "don't know" answer. If participants say, "I don't know," probe at least once by asking questions like "What is your best guess?" or "On average, would you say ...?"
- Repeat the question or answer categories.
- Let participants know that 100% accuracy is not required. Remind participants that we are interested in how they usually eat. The answers that comes to mind first are likely to be the best.
- Use neutral probes that do not suggest answers or imply judgments.
- If you are unsure how to code a response, write down as much detail as you can so that you can check with the DAC later.
- Always keep yourself and the participants on track.
- Document any potentially confusing information fully and clearly.

6.3 Notes on Communication: Language, Literacy, and Other Issues

During an interview, be aware of the following:

- Language differences among participants. Have a bilingual conversation as needed
- Some foods may only be known in the original language (e.g., frijoles for beans).
- Literacy level and level of understanding when interviewing participants. The interview scores at about the 8th grade level (lower for instructions only); however, this assumes English is the participant's first language.

- Non-verbal cues that indicate lack of understanding
- Difficulties with the cue cards because of vision problems (this should be rare).
- Hearing difficulties. Assist the participant by lowering the pitch of your voice, slowing your speech, and enunciating clearly. Do not yell.

6.4 Using the Scannable Form

The table below summarizes the guidelines for the proper completion and handling of the MESA Nutrition Interview Form. A correctly marked form is provided at the end of the chapter.

DO	DON'T
Use a #2 pencil <i>only</i> (preferably one provided by the DAC)	Use a colored pencil, pens, flairs, markers or felt tip pens
Fill in center of bubbles completely	Leave bubble partially shaded
Complete <i>all</i> pages	Skip any pages
Keep pages flat	Fold pages or mark pages by folding the corners
Use boxes above bubbles to write in information	Forget to fill in bubbles under boxes

7. Conducting the Food Frequency Interview

7.1 Meal and Snack Frequency (page 2)

If participants give a range, take the midpoint and then confirm it is accurate. For example, for a response of “2 to 4” snacks a day, the interviewer would ask, “Would you say 3 is a good average?” For a response like 2–3, ask, “Is it more often 2 or more often 3 snacks a day?” If the participant insists on 2.5, code it as 3 (i.e., round up). If meal or snack frequency is very different for work days vs. days off, ask about “most” days.

7.2 Restaurant Frequency (page 2)

Restaurant foods include fast foods, “take-out,” and home delivery of whole meals, including pizza, if it constitutes a meal.

7.3 General Guidelines for the Food Frequency Interview

- 7.3.1 Review the instructions with participants before launching into the food list. This will set the stage and will give participants important information they will need in order to respond appropriately in the

interview. Maintain a friendly, conversational tone. Stick to the key points on the form. Do not “wing it,” especially early on in your experience. This leads to errors and confusion. Watch the participant to be sure he/she understands.

7.3.2 The exact wording on the form is for the benefit of the majority of the participants who will complete this as a self-administered form. Adjust the language as appropriate for interviewer-administration. For example, instead of “tell us how often...,” say, “I will ask you how often you eat different foods; then, I’ll ask you about your usual serving size.”

7.3.3 Do *not* give the form to participants and try to read it to them at the same time. This is a poor interviewing technique, because participants have trouble reading along and paying attention to you at the same time.

7.4 Presenting the Food Frequency Lists

7.4.1 Present the frequency responses *before* you start the actual food list. Going over the list of responses at the beginning will save time in the long run and avoid confusion. Occasionally, you can point to an answer selected by the participant to verify the response and to keep the participant oriented to the list of answers.

If participants have trouble choosing a frequency, you can help by providing a range. Use your judgment, based on what the participant has already said. For example, if the participants say they drink orange juice “all the time,” ask if this is more or less often than once a day. If, after this attempt, the answer is still unclear, remind participants that they are not expected to remember everything they eat exactly, but, rather, just an average of what they usually eat. It’s important not to let participants get discouraged or bogged down in detail early in the interview. Just ask for a best estimate, based on what they do remember.

7.4.2 Present the portion size responses before you start the actual food list. Explain to participants that a “small” serving size indicates that they eat a little of the food, compared to others of the same age and sex; that a “medium” serving size indicates that they eat an average amount of the food, compared to others of the same age and sex; and that a “large” serving size indicates that they eat a lot of the food compared to others of the same age and sex.

Once again, remember not to get bogged down in excessive detail. We do expect exact reporting of portion sizes. We simply want the

participant to give us an estimate of their typical portion size for each line item. Once the participant gets the idea, the interview should go quickly. If each line item requires more than a few seconds to complete, the interview will last much too long, and data quality will suffer.

If participants report that they eat a food “rarely or never,” do not ask serving size and leave the serving size column blank.

- 7.4.3 When presenting each food item, ask for frequency first and portion size immediately after.

7.5 Food List (pages 3–14)

- 7.5.1 There are food-type headings (e.g., fruits and juices, cereals and other breakfast foods, snacks) throughout the form. Let participants know the name of the section to help them orient their thinking. For example, say, “First, we’ll go over fruits and juices.”
- 7.5.2 For each line item, in general, you should read all items on the list. There are some items that will almost never apply to certain centers or to certain participants. For example, if a participant is vegetarian, you will not need a response for *every* meat line item; however, you should still confirm in the food list section that he/she does not eat any type of beef, pork, chicken, etc. It is sometimes appropriate to use some judgment, but remember that consistent use of the interview across centers is vitally important. Inclusion of all line items is necessary to avoid missing the particular food choices that may enable us to discern relatively small but potentially important differences in nutrient intake between individuals. Remember not to assume too much!
- 7.5.3 For the fruits, “when in season,” ask the participant to report how often those fruits are eaten when they are in season (i.e., when they are available where the participant lives). Unless the line item specifically says, “when in season,” the items are assumed (by the nutrient analysis program) to be available all year. If the participant eats the item during only part of the year, obtain an estimate of average intake over the year. For many situations, this will be “rare or never.” A common example is pumpkin pie eaten 3 times per week, but only during the weeks of Thanksgiving and Christmas.
- 7.5.4 Most items in the meat, fish, and poultry section are main dish items. While you can check to make sure that the total number of main dishes makes some sense, remember that many people do have eating habits that may seem unusual to you. Probe further if you hear

something that seems highly unlikely, but don't try to get answers based on your expectations of food habits.

- 7.5.5 Do not overlook the question about specific cereal type! Ask the participant what type of cereal they eat most often. As a check, this cereal should fit into the cereal line (of the four cereal lines) that is reported with the highest frequency. If this is not the case, ask the participant for clarification.

The DAC will be distributing a list of cereal codes. Until then, just write down the brand and name of the cereal and leave the 3-digit code blank.

- 7.5.6 When you review the response set for beverages, be sure to remove the old set from sight and point to the new set of answers to avoid confusion. Be sure that the frequency of milk as a beverage does *not* include milk used on cereal or in coffee or tea. You will have to ask about each type of alcoholic beverage. Alcohol consumption can be a sensitive issue for some participants. Be objective and respectful as you administer this part of the interview.

- 7.5.7 If a participant thinks of additional information during the interview related to a food item you have already coded, go back to that item while the participant is thinking of it and modify the answer as needed.

7.6 Food Preparation (page 15)

Tell the participant that you will now ask a few more questions about their diet. Review responses (never eat the food, seldom or never, sometimes, often or always). For the questions about type of fat used, the scanner will accept either one or two answers. If the participant uses only one type of fat, if at all, fill in only one bubble. If the participant uses more than two types of fat, record only the two that he/she uses most frequently.

7.7 Quality Control Questions (page 16)

Roughly compare the responses to the quality control questions on page 16 to the responses in corresponding line items (e.g., fruits) to be sure they are reasonably consistent. (Over-reporting on the specific line items is more common than under-reporting. Do not be concerned about small inconsistencies: one high or low response is fine.)

- 7.7.1 Add up the frequencies of the following vegetables listed on page 6 and compare the total to that reported on page 16.

- Carrots
- Broccoli, cabbage, cauliflower, brussel sprouts, sauerkraut, kimchee
- Green beans, peas, snow peas
- Corn, hominy
- Winter squash, acorn squash
- Any other vegetable including summer squash, zucchini, asparagus, mixed vegetables

7.7.2 Compare the frequency for “Cold cereal” on page 4 to that reported on page 16.

7.7.3 Add up the frequencies of the following fruits listed on page 3 and compare the total to that reported on page 16. (Note that seasonal fruits may make up the difference in the number reported on the quality control question; adjust for this, if necessary.)

- Apples, applesauce, pears
- Bananas, plantains
- Oranges, grapefruit, tangerines, kiwi
- Dried fruits including raisins, prunes, figs, apricots
- Any other fruit (pineapple, persimmon, grapes, other melon, canned peaches, fruit cocktail, etc.)

7.7.4 If responses are inconsistent by more than one frequency category, attempt to clarify.

7.7.5 Re-ask the quality control question, emphasizing “not counting salads, potatoes, or mixed dishes” for the question regarding vegetables and “not counting juices” for the question regarding fruit.

7.7.6 If the response is still inconsistent, briefly review the specific foods for clarification or correction, as needed.

7.7.7 If you cannot resolve the inconsistencies fairly easily, move on and note this in the comments section on page 17 (fill in bubble 3 and then record the comments).

7.8 Additional Foods Question (page 16)

Ask the participant if there are any *previously-unreported* foods that he/she eats *at least once a week*. Give the participant a moment to think before moving on. For any foods reported, incorporate them into the main body of the questionnaire, as appropriate, including frequency and portion size. See section 9, “Guidelines for Coding Foods.”

7.9 Comments Question (page 16)

Sometimes a participants will tell you something about their diets that is important to but not appropriate for inclusion on the interview form. For example, a man may note that his wife usually does the cooking. You can note these things in the comment section so that the participant knows you are listening to them and are ready to move on. These comments generally require no further review

8. Completing the “Clinical Use Only” Section of the Form (page 17)

- 8.1 If there are problems with the interview, note them in the space provided and fill in bubble 3, “Yes, Diet Data Center review needed.” Your notes should include any discrepancies that remain with the quality control questions after you have attempted to resolve them with the participant.
- 8.2 Attempt to resolve all food coding questions prior to sending the interview form to the DAC. For foods that will need to be incorporated into the questionnaire but that you are unsure about, write down as much information as possible, including name brands, if the product is a “diet” (e.g., low fat, low sugar), etc. If a decision is needed about coding a new food, try to have it made before you send the form to the DAC for processing. Either email or fax any coding questions to Dr. Beth Mayer-Davis (this provides us with documentation and avoids use of special form). A decision will be made based on the nutrient content of the food. Periodically, the DAC will update and distribute the Guidelines for Coding Foods so that coding will remain standardized across the centers.
- 8.3 Do not check “no review needed” (bubble 1 or 2) until coding decisions are finalized and have been incorporated into the form.

9. Guidelines for Coding Foods

For items eaten *at least once a week* and not listed explicitly on the questionnaire, coding rules were developed based on nutrient content of the item in question.

Be sure to add the newly reported food accurately. Do not “double count” items mistakenly reported twice. Add new items to any existing items in the same line (do not simply replace the original answer with the new food). Remember that the total amount consumed is equal to frequency times portion size. In general, if needed, to “add” a newly reported food to a line item, you may assume that “small” is about ½ the amount of medium, and “large” is about 1 ½ times the amount of medium. Thus, you can use any combination of frequency and portion size to approximate the correct total intake. For example, 2/week, small, is the same as 1/week, medium.

9.1 Fruits

- Fruits added to cereals should be coded in the fruits section, if the quantity is $\frac{1}{4}$ cup or more; otherwise, do not code.
- For snack fruit bars, fruit roll-ups, etc., code as dried fruit.
- Code Gatorade with other juice.
- Code 5-Alive as orange juice.
- Code ackee (or akee, ahee) as other fruit.

9.2 Vegetables/Side Dishes

- Green salad codes (automatically) only for lettuce and a few slices of tomato. If a salad is usually topped with other vegetables ($\frac{1}{4}$ cup or more), code these items in their respective lines. The serving size will usually be “small” for items added to salads.
- Code V-8 juice as tomato juice.
- Code carrot juice as carrots at twice the reported frequency.
- Code chard as spinach.
- Code artichoke as other vegetables
- Do not code garlic.
- Two rice cakes are coded as 1 small serving plain rice.
- Code a medium serving of tabouli as one small serving of *each* of the following: pasta/couscous; other vegetables; “butter, margarine, or oil on vegetables, rice, or potatoes.”
- Code babaganoush as other vegetable.

9.3 Meats, Poultry, Fish, Mixed Dishes

- Code red or green chili as a condiment. Code $\frac{1}{2}$ the reported frequency to account for the difference in portion size for chili as a condiment compared to a bowl of chili as a main dish.
- Code pasta Alfredo as pasta with cream sauce or cheese (no meat).
- Code pesto sauce or olive oil on pasta as “butter, margarine or oil on vegetables, rice or potatoes.”
- Code pizza rolls as pizza.
- Code menudo as beef.
- Code pickled herring as tuna at $\frac{1}{2}$ the reported frequency.
- Code caviar as shellfish (not fried).
- Code frozen entrees or dinners by their component items (e.g., code each item in a chicken, rice, and green beans frozen dinner separately). Ask the DAC for assistance if needed.
- Code jerky (beef, chicken or fish) as bacon.
- Code barbacoa as sausage at twice the reported frequency.
- Code chicken and dumplings as “meat, chicken, or turkey stew, pot pie

or empanada.”

- Record veggie burger in the comments section on page 17 and fill in bubble 3 (Diet Center review needed).

9.4 Breads and Snacks

- Code chips made with safflower or canola oil as regular chips.
- Code blue corn chips as regular corn chips.
- Code low-salt chips, including low-salt blue corn chips, as regular corn chips.
- Code low-salt popcorn as regular popcorn.
- Code low-sodium crackers as regular crackers.
- Code matzo balls as biscuits, scones, etc.
- Code potato bread as white bread.
- Code unsalted butter or margarine on bread as regular butter or margarine.
- Code trail mix as half “salty snacks” and half “nuts and seeds.”

9.5 Breakfast

- Code Eggbeaters or other low-fat egg substitute at ½ the reported frequency.
- Do not code egg whites only.
- Code cooked bulgur, kasha, oat bran, etc., as cooked cereals.
- Code French toast as one egg and one serving bread.
- Code wheat germ as cold cereal.
- If the participant does not use milk on cereal, decrease milk as a beverage by half the frequency of reported cold cereal use.

9.6 Sweets

- Code sugar-free “spreadable fruit” as “other fruit” (or add to the specific line item for that fruit if possible) at ½ the frequency.
- Code sweet dim sum as cake doughnuts.
- Code graham crackers as cookies.
- Code NutraSweet fudgsicles or other specialty dairy desserts as frozen yogurt/ice milk.
- Code granola bars, breakfast bars, Power bars as cookies, cake. If bar is a meal replacement bar, code as “Instant Breakfast, Ensure, Slimfast.”
- Code “dietetic” cookies and cakes as such at ½ the servings reported.
- Do not code sugar-free Jell-O.
- Do not code calorie-free candies, mints, gum, etc.
- Code syrup with other candy, jelly, honey, etc.
- Code Weight Watchers Mousse Dessert as frozen yogurt/ice milk.

- Code Weight Watchers Cookies as regular cookies at ½ the reported frequency.
- Code Cracker Jack as cookies/cakes/dessert.
- Code non-fat cookies at ½ the reported frequency.
- Code sugar-free pudding at ½ the reported frequency.
- Code light syrup at ½ the reported frequency.
- Code diabetic ice cream as frozen yogurt/ice milk
- Code non-fat ice cream as frozen yogurt/ice milk.

9.7 Dairy Products

- Code fat-free, sugar-free yogurt as plain yogurt

9.8 Beverages

- Code Crystal Light or other calorie-free, unfortified beverage mix as diet soda.
- Code Malta as lemonade, sweetened mineral water
- Code Mocha Mix in coffee as non-dairy creamer.
- Code evaporated milk in coffee at twice the reported frequency.
- Record other milk substitutes (like LactAid, soy milk), specifying brand and fat content, in the comments section on page 17 and fill in bubble 3 (Diet Center review needed).
- Code lactose-free milk as milk (whole, 2%, 1%, skim).
- Code Optifast as Ensure/Instant Breakfast.
- Code evaporated milk as twice the frequency of milk.
- Code flavored coffee mixes as regular or decaffeinated coffee at twice the frequency reported; plus sugar in coffee (large) and non-dairy creamer (large).
- Code Yoohoo as chocolate (one medium serving for one bottle).
- Code light beer as regular beer
- Code wine cooler as wine.

9.9 Fats

- Code diet soft margarine as soft margarine.
- Code vegetable shortening as stick margarine.
- Code unsalted butter or margarine as regular butter or margarine.
- Do not code Molly McButter or other calorie-free butter flavoring, fat-free margarine, fat-free mayonnaise, or fat-free sour cream.

9.10 Miscellaneous

- If a participant reports luncheon meat, remember to probe for some type of bread.

- Code matzo ball soup as other soups.
- Code SlimFast Cup-A-Soup as other soups.
- Do not code mustard, soy sauce, pica, or calorie-free seasonings.
- Code amaranth as cooked cereal.

10. Vitamins and Other Supplements

10.1 Participants will be instructed prior to this clinic visit to bring in bottles of any vitamin or other nutritional supplements they take, along with all prescription and over-the-counter medications. Therefore, this section will be completed at the time of the Medication Inventory.

10.2 The Nutritional Supplement portion of the questionnaire is divided into sections to facilitate the collection of the vitamin and supplement data. In the first section, on page 18, ask the questions and follow the appropriate skip patterns. Use the second section, pages 19–21, as a worksheet to organize the vitamin, mineral, and other supplement information. (There is also a space provided on page 21 to list any other nutritional supplement that is taken at least once a weeks but is not included on the form list.) These pages will not be used for data entry. The last section will be used to code the following information for selected vitamins, minerals, and other nutritional supplements:

- Overall frequency of use (1–3/month vs. 1/week or more).
- Detailed information on *only* selected items and *only* for those that are taken *at least* once a week.
 - Number of pills per week
 - Dose per pill
 - Duration of regular (at least once a week) use. Dose *changes* during that period are not recorded

10.3 Recording Doses

10.3.1 Record dose from the supplement label. If the participant has forgotten to bring in the bottle but is absolutely confident of the dose, you may record the dose as reported by the participant. If the participant is unsure, arrange to call him/her later in the day and have the dose information read to you over the phone. If, for reasons of literacy, vision, etc., this will not work, try alternative solutions (e.g., bring in the bottle on another day; have a relative or friend read over the phone). Be sure to hold off scanning the form until this is resolved. If all else fails, enter 99999.

10.3.2 Fill in leading 0's for the dose data. For example, if the participant takes 500 mg of vitamin C, record "0 0 5 0 0," not "5 0 0 ."

- 10.3.3 If the participant does *not* take a particular supplement at least once a week, you may simply leave the rest of the fields blank. You do not need to fill in 00000.
- 10.3.4 *Be sure that the units on the bottle are the same as the units printed on the form.* If the units are different, check with the DAC as to how to convert the units on the bottle to match those on the form. Make a photocopy of the bottle to refer to, if needed.
- 10.3.5 If you have any question at all about recording of supplement information, we encourage you to contact us at the DAC for clarification. For the quickest response, email Beth Mayer-Davis at ejmayer@sph.sc.edu.

III. NOTES ON STATISTIAL ANALYSIS OF DIETARY DATA

1. Expected Error in Dietary Data: Bias vs. Precision.

It is important to note that the misclassification expected by form assessment of usual dietary intake is assumed to be non-differential—that is, imprecise but unbiased relative to other variables of interest. This will generally lead to underestimation of true associations. Although there is a growing body of literature dealing with ways to adjust estimates of association for this random misclassification, we will not have the necessary estimates of “true” intake (usually derived from multiple 24-hr recalls) required to make such adjustments.

Even though error in estimation of dietary intake is expected to be non-differential, it has been shown that if a continuous variable (e.g., grams of dietary fat) is categorized into, say, quintiles, estimates of association such as odds ratios with a referent to the lowest quintile could be biased (Flegal et al., 1991). Therefore, a decision to evaluate a categorized dietary variable that was collected as a continuous measure should be made with caution.

2. Consideration of Total Caloric Intake.

Willett (1990) has summarized several ways to account for the close relation of macronutrient intake to caloric intake. Two common methods are use of energy-adjusted nutrients and use of grams of a nutrient. In both cases, total calories are also entered into the model. These models give identical results for the association of the nutrient with the outcome (Palmgran and Kushi, 1991); however, the interpretation of the estimate of association for total calories differs. More recently, it has been noted that, for some hypotheses, adjustment for total calories may not be as important as adjustment for kg of body weight or other variables. This may be particularly true in the case of nutritional

supplements.

3. Colinearity Between Nutrients.

Even after adjustment for total calories, some nutrients may be too highly correlated to be evaluated in a meaningful way when included simultaneously in a statistical model (e.g., palmitic and stearic acid).